United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Salt Lake District Office
2370 South 2300 West
Salt Lake City, Utah 84119

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

7000
(U-022)

FEB 26 1992

Diane Neilson, Geologist
Director, Utah Div. of Oil, Gas, and Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84106

Dear Diane,

Thank you for your participation in the last meeting of the Bonneville Salt Flats Technical Review Committee (TRC). I think the meeting was quite productive and I appreciate the level of concern which you have shown for the salt loss study.

I have enclosed the draft of the minutes for your review. I have also sent along a copy of the letter which I sent to Lee Case in order to follow-up on the issues which the TRC raised. Phil Allard will be out of town until mid-April. Should you need any assistance with TRC matters before then, please call Steve Brooks at (801) 977-4300.

Sincerely,

Deane

Deane H. Zeller
District Manager

Enclosures
As stated above

Minutes of the Technical Review Committee
Meeting of 2/18/92
Recorded by Philip Allard

Attendance:

Committee Members:
- Paul Anderson (PA)
- Craig Forster (CF)
- Ton Netelbeek (TN)
- Stanely Plaiser (SP)
- Jim Kohler (JK)
- Diane Nielson (DN)
- Hugh Coltharp (HC)

Bureau of Land Management:
- Philip Allard (PhA)
- Gary Wieser (GW)
- Joprdon Pope (JP)
- Deane Zeller (DZ)

U. S. Geological Survey:
- Jim Mason (JM)
- Joe Gates (JG)
- George Piper (GP)
- Pam Muir (PM)

Preliminary Meeting

A preliminary meeting was held beginning at 9:30 in the BLM conference room at the Salt Lake District Office. The representatives of the U.S. Geological Survey was not in attendance at the preliminary meeting.

1. The minutes were read. Two changes were recommended by the committee. One indicated that the word "not" be inserted in a sentence on page two. The second was that the minutes should reflect that an assistant was being hired for Bil Brothers. DN moved to accept the minutes as amended, CF seconded, passed unanimously.

2. GW was introduced to the group as the new Assistant District Manager for Resources for the Salt Lake District, BLM.

3. The committee then reviewed the quarterly report submitted by the USGS. DN asked if the mass water level measurements had been taken as planned. TN said that he felt that the report was too general and that a greater level of precision was needed on the part of the report to ensure adequate review. CF shared this concern.

4. TN asked about the status of the interagency agreement between BLM and USGS. PhA said that it was through most levels of review and that it should be shipped to Denver by the end of the week.

5. The group discussed the USGS policy towards data release. The group understanding on this was that data without interpretations could be released without review but that after interpretations were made no release could be made until USGS completed their internal review. (PhA note: this issue needs follow up).

6. PA asked about pond migration study. He read the report to indicate that activities were planned in this area but did not know if a final approach on the pond migration study had been determined.

7. TN asked about the status of the salt replacement study. HC said that he had not heard anything about the status since the last meeting but felt that one of the key racers had been unavailable since the last meeting.

8. PA asked PhA if PhA had communicated the Committee's concerns to the USGS regarding the adequacy of previous quarterly reports. PhA said that an attempt had been made but wasn't sure if it had been successful.

The preliminary meeting concluded at this point (approximately 10:00 am) and the representatives of the USGS were then invited into the room.

Full Meeting

1. JM went through the quarterly report that had been submitted. Completed three wells to the depths listed, cased with 2" PVC. These holes would be observation wells for the alluvial fan pump test. Two were placed in line with the other observation wells and one was placed perpendicular to this line. Of the wells in line one was about 200 feet from the production well and the other was about 500 feet from the production well. All three were screened for the ten foot interval directly above the total depth listed. The screened interval was selected because they encountered drilling returns of broken gravel. The sand pack extended from total depth to 5 feet above the top of the screen. The balance of the annulus was filled with bentonite chips slurried with ambient water, although some fresh water was also used.

One of the three holes was cored. JM reported that a mud-rotary rig was used with a ten foot core barrel. The core barrel was transported using a wire line in the drill stem. Only 40% recovery of core was received of which only two undisturbed cores were collected for analysis by a geotechnical contractor. The main data desired is information on vertical conductivity and storativity of the confining layer between the brine aquifer and the alluvial fan aquifer. The core is stored in an acrylic sleeve that was in the core barrel. The acrylic sleeve was cut through the sampled interval and the samples were capped and taped at both ends. The cores are stored at room temperature to prevent the precipitation of merabilite which could occur at 40 degrees F. They had hoped to recover additional core that they could then have shared with

some independent laboratories, however, this was not possible.

If the geotechnical contractor reports that the core has been disturbed so that the analysis is not meaningful, then additional coring will be attempted. The next coring will take place in March if this is needed using a hollow stem auger. Although this equipment is limited to about 100 feet in depth, the driller is more experienced with coring than the previous driller so it is expected that the core recovery would be much better.

The core hole was drilled originally to about 5" and then reamed out to about 5 3/4" to 6" for completion. JM reported that there were electric logs and gama ray logs taken of the holes that were drilled by Singer's group in September and October.

JM reported that the material encountered in the November drilling showed very little variation. It was dominantly lacustrine clay of differing consistencies. There will be a log and data report prepared on each hole. The screened interval was lacustrine but there was water present. Of the holes which were not cored, one was in line with the nested wells and one was perpendicular to the line. JG reported that it was not their interest to measure in detail the anisotropy of the aquifer in plan. There are four nested wells starting a 1,000 feet from the production well and finishing at 7,000 feet from the production well. The nested wells contain three completions each at various levels. JM reported that the placement of the wells was determined by running a simple radial computer model based on the Theis Curve. This is a model that predicts drawdown. Because the wells are nested, vertical anisotropy can be measured during the pump test. The main objective of the pump test is to evaluate the boundary conditions at the alluvial fan and not to measure the anisotropy in plan view.

(The discussion above was not presented as a monologue. There were many questions asked by members of the committee including CF, DN, PA and SP.)

2. JG pointed out that much of the drilling done by the USGS was completed before there was a firm commitment of funding by the BLM to the USGS.

3. JM diagramed the position of the holes on the board. A copy of this diagram is attached as Figure 1.

4. PA asked what difference there was in the elevation of the various holes. JM said that there was very little, but there is a berm from an old ditch between the production well and some of the observation wells. JM also described some of the problems they had with the core drilling crew.

5. PhA passed around some core samples from the drilling.

6. JM said that the new coring team is much more experienced than the first coring team; however, they can only collect shorter

cores. CF expressed an interest in having additional core collected. JM pointed out that there is a concern with the expense of drilling and coring and that the budget needed to be considered. SP pointed out that his organization has also had difficulty collecting core in the same area. The financial risk of coring may not be justified. CF pointed out that the USGS has to be certain that the cores collected are representative of the material. JM said that the new system was limited to 100 feet and that this 100 feet may not be representative. SP asked if the data from the core were critical to the study. JM said that the core data will be used to refine the model but that the core data are supplemental to the pump test data and that the pump test data would be controlling if there are differences.

7. PA asked JM to describe how the wells related to figure 2 attached to the quarterly report. JM said that the diagram was not to scale, but that he plans to have a more detailed explanation of the well completions before the pump test is conducted.

8. JM said that the new wells need to be surveyed by the BLM. (PhA note: this item requires followup).

9. JM said that the USGS plans to run additional modeling before conducting the pump test. They are not yet certain if they need to adjust the wells to fresh water head equivalent. All the data is not yet available. JM described the material in the shallow aquifer as not as distinct as the other lacustrine materials. The material seems to be quite a bit more plastic than the other lacustrine materials. It may be of the same mineralogy, but not as consolidated. The porosity of the material is probably fracture dominated.

10. JM then discussed the water level sampling. He said that the planned water level sampling was delayed because of the personnel requirements of the drilling effort and the large body of water that restricted access to the salt flats starting in November. There are two continuous recorders installed. One is on the production ditch. Two weeks of data were lost because of technical problems with the equipment. The water level has recovered since pumping out of the ditch has stopped. Specific gravity of the water is measured in the field using a hygrometer. The other recorder is located on the well north of the Salduro ditch. Additional measurements were taken in the last several weeks because the level of the water on the area has declined some.

11. GP described the aerial photography which is planned for the next two weeks. JM wanted to pick a time with a more representative baseline, either totally dry or totally flooded; however, the USGS has decided to go ahead. The flight will use black and white infrared. The interface between the water and the salt is very hard to see. Quite a bit of sediment has covered some of the salt making it a light tan color. They plan to end up with a scale of about 1:36,000 or 1"=3,000'. They may end up with something different. The use of satellite data was discussed. PhA

said that the BLM was investigating this and that the French SPOT data was probably the best but was also the most expensive. He also said that the BLM was looking to see if there were public domain data available from Landsat that would allow the BLM to design an analytical technique before spending money on imagery.

12. PA asked if a decision had been made by the USGS on how to analyze the data collected on the ponds. JM described the difficulties in trying to measure the ponds using sequential photography and suggested that it might be difficult to obtain quantitative results. JM also said that he felt that he wasn't certain that there was enough precipitation this fall to generate the pond. GP said that the water level was high at the end of the fall (before any precipitation) and that it may only have required a small amount of precipitation to generate the pond. GP said that they are presently planning a minimum of three flights between now and September. Cost of photography has increased by 40% since the original proposal was prepared, but the second flight might be discounted from the first because the contractor might have film left over. SP asked if they would mark the water salt boundary on the ground before the flight. GP said that targets would be placed before the flight.

13. CF suggested that it might be practical to map the water/salt contact on the ground using GPS technology and that the concentration of the lake water could be determined at the same time. CF also asked about the quality of the water in the pond. JG reported that the water had a specific gravity of 1.21 and was not yet saturated. PA asked what was saturation and it was estimated by several in the group that saturation was probably 1.25. JG also reported that the quality of water was consistent in the three samples analyzed. CF suggested that a stationary conductivity recorder somewhere in the pond might help to show how the water chemistry changes with time which might help us understand the ponds as a mechanism for salt transport. GP said that there is a s much as 1/2' of evaporation per day from the ponds.

14. HC advised that the water will start disappearing by April and said that the end of the access road is not a representative place to sample the pond.

15. JM then discussed the status of the computer modeling effort. JM said that they had recently concluded discussions with their Denver Office and that Ken Kipp of that office was now committed to this project. Ken Kipp developed the HST computer model and apparently has the time and needs the funding that the work would provide. Specific modeling choices have not yet been made. The HST code is desirable but they may not have access to a computer with the capability of running the model. Salt Lake WRD wants to stipulate that they have access to the computational power required so that later modeling runs can be made.

The most desirable model would be variable-density-with-transport

in three spatial dimensions. It might be necessary to simplify the model to variable-density-without-transport or to a model run in two spatial dimensions. Although USGS wants the model to be able to run on their Data General Workstation system in Salt Lake, they will not simplify the model to the point where no useful results are generated.

JM suggested that if the committee has any concerns with the modeling that they be identified soon so that they can be incorporated in the effort. JG said that the main goal of the model is to determine if there is enough flow under the highway or through the ditch to account for the loss of salt from the flats.

16. PA said that it is important to measure the pumping rate and concentration of the ditch.

17. JG asked SP if Reilley had answered the question regarding flow. SP said that Reilley is doing this independently and suggested that USGS contact Don Hall at Reilley. JM said that Glen Wadsworth said that Reilley was collecting data on this SP said that the flow meter used is not necessarily a continuous record USGS plans to compare their data with Reilley's to ensure consistency and they also want to install a stage height recorder on the ditch.

18. JM and JG then asked if there were questions on the pump test or if the committee would like clarification of this. JM said that he would prepare this and share it with the committee. The production well is scheduled to be pumped at the rate of 1,000 gallons per minute. The production wells used by Reilley that are completed in the same zone generate 1,00 to 1,700 gallons per minute. They do have a copy of the well completion report that was filed with water rights on the production well to be used.

19. PA had a question regarding the I-80 pump test. PA said that he thought USGS was going to look at water level data before the pump test was conducted. JM said that they will still do this and that the quarterly report had been revised to reflect this. JM asked CF for a reference on the possibility of using drive point piezometers. CF said that JM should contact Waterloo at (519) 885-1211 as a source of information on this technique. (I think this means the University of Waterloo in Waterloo, Ontario, Canada.)

20. CF asked if the USGS had any generic thought on what they were to do on the Pilot Valley component of the study. JM and CF agreed to get together to compare notes on this and an appointment between the two was made. CF said that some of the data on Pilot Valley had been returned including major elements and oxygen isotopes. He said that the data on tritium, carbon and sulphur had not yet been returned. CF said that many of the sample locations are on the margins of the playa so that access for resampling may be feasible.

21. This completed the agenda. The committee agreed that the next meeting should be targeted for May after the alluvial fan pump test

is completed.

Post Meeting

The committee reconvened after the USGS and most of the BLM representatives had left. DN had left earlier and HC left part way through the post meeting.

1. There was a group consensus that the committee was disappointed with the quality of the visuals. Also they felt that there had not been much change from previous presentations. The members would like to see a working map that shows the location of all the old piezometers, all the new piezometers the location of the production wells and the pumps and andy recorders that are installed. It was suggested that the USGS probably has such a working map. DN left a note suggesting that the next meeting be held at the USGS to make it possible for the USGS to access there working materials if questions come up. The group felt that this could be appropriate.

2. HC suggested that aerial photography should be continued into the fall and decisions should be made based on weather conditions.

3. PA said that they didn't have much of a plan on the wind driven ponds and felt that it might not be a big issue if the ponds remain within boundaries of the modeled area. TN said that it is an important mechanism to understand especially if the ponds migrate outside of the modelled area. The group consensus was that this is a difficult issue.

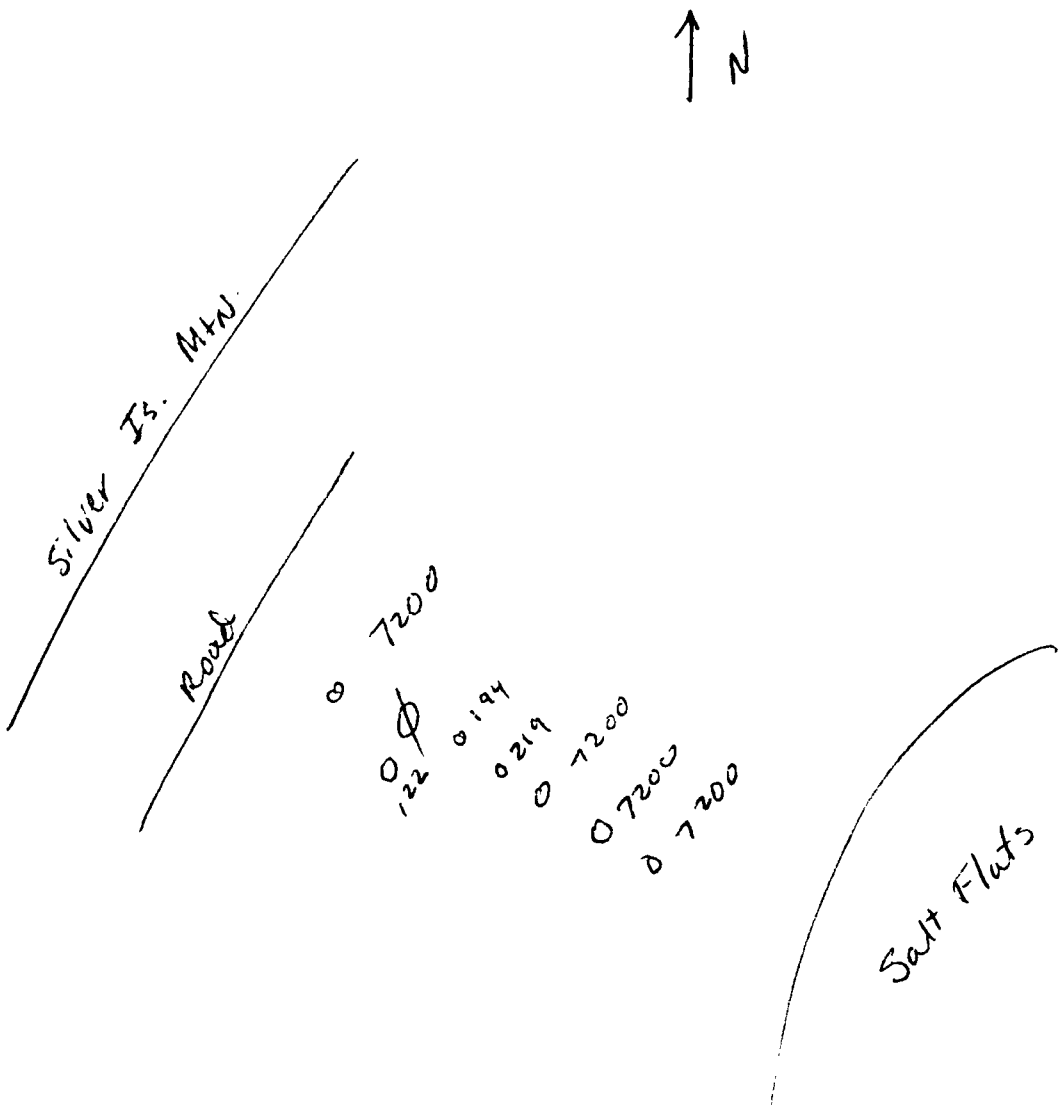
4. PA said that he was uncertain if the model would be run before they ran out of money for the for data acquisition. The TRC recommended that the BLM share this concern with the USGS.

4. PA said that he felt that they had abandoned the idea of having three lines of wells. TN said that he did not think that this was correct. He felt that one line represented the alluvial fan, one represented the ditch and one represented the highway.

5. SP said that he was surprised that little stratigraphic data were collected in the last round of drilling. He suggested that the committee needed to follow up and see what the data from the drilling looked like. He was specifically interested in which wells had geophysical logs and which logs had been run. He was also interested in the status of cuttings logs. The committee then discussed the need for good stratigraphic data on the alluvial fan boundary and questioned if additional coring for hydraulic conductivity data was as important as additional stratigraphic data. The committee recommendation to the BLM offered that the TRC review the logging data and the well completion information to judge if additional work on stratigraphy should be recommended

6. The TRC would like to see the working maps, cross sections, well logs and real data so that they can better understand the

progress of the study. This would be more helpful than additional summary level information.



NOT TO Scale

Figure 1.

United States Department of the Interior

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2370 South 2300 West
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H. Lee Case III
District Chief
Water Resources Division
U.S. Geological Survey
Administration Building, Room 1016
1745 West 1700 South
Salt Lake City, Utah 84105

Dear Lee,

I am sending this letter to follow-up on the meeting with the Technical Review Committee (TRC) and your staff which was held on February 18, 1992. I believe this was a very productive meeting for us. Jim Mason and Joe Gates reported your progress to date and also laid out a description of your short-term plans.

Now that the study is under way, the TRC has taken on a new importance for me. Traditionally, the BLM has contracted with the WRD in areas where we lack expertise and has deferred to the WRD's judgement in technical areas. With the involvement of the Salt Flats TRC, that relationship has now taken a somewhat different form. BLM is relying heavily on both the WRD and the TRC to arrive at study results that tell us why the Salt Flats are being lost and what can be done about it. I realize that the TRC involvement, at times, may be disconcerting to some of your people. I hope those feelings are minimal and that we all continue to focus on the critical needs of the study.

After the meeting the TRC made three recommendations to me which I believe warrant your attention.

First, the TRC emphasized to me the importance of the computer modeling to the study effort. They pointed out that the modeling is most effective if the model can be run before the data collection effort is completed. This preliminary run of the model can then be used to direct where data collection should be focused. Jim Mason indicated that you had recently received a commitment from your

Denver Office to assist in the computer modeling. The TRC's recommendation is that you put a high priority on bringing the modeling effort up to speed.

The second concern was focused on the coring effort. Jim Mason described some of the difficulties that WRD encountered during coring and indicated that the decision to take additional cores would be made if no useful data were obtained from the cores that have already been taken. The TRC understands that the data obtained from the core would be used to supplement the data obtained from the pump test of the alluvial fan. If this is true, then the TRC recommends that the WRD seriously consider if additional coring is justified solely for the purpose of obtaining vertical hydraulic conductivity and storativity data.

The third concern of the TRC related to the stratigraphic data which have been collected on the alluvial fan. A lot of new data have been collected with the drilling that has been done. Geophysical logs have been run on several holes and cuttings logs have been recorded. I understand that WRD will be preparing a geological cross section of the alluvial fan based on these new data. This cross section will be used to define one of the boundary conditions used in the computer model. Therefore, it is quite important. The TRC would like to see the WRD's working maps and cross sections and the raw data on which they are based. The committee wishes to see these materials so that they can formulate a recommendation on whether funds should be moved from additional coring to additional stratigraphic analysis.

This last request may cause some problem for you. I understand that WRD has strict policies regarding the early release of reports, but the TRC is having difficulty understanding and tracking the progress of your work and has requested to see progress reports tied to working maps, well logs, cross sections, and raw data bases. I would like to see if there is some way of accommodating the TRC because I feel that they are an important component of the study process and will assure that the study is acceptable to the members of the coalition. The TRC has suggested that the next meeting, scheduled for sometime in May, could be held at your offices. Also, the TRC is willing to look at these materials at the earliest convenience of the WRD if drilling decisions need to be made prior to May.

One last thing - I think it would be good for us to sit down together and compare notes. The salt loss study is very important to me personally and a meeting between us at this point would be helpful. Please give me a call at (801) 977-4300.

Sincerely,

Deane H. Zeller
District Manager